

THE INFLUENCE OF *DIGITAL FINANCIAL LITERACY* AND *SOCIAL NETWORKS* ON *FINANCIAL INCLUSION* : AGE-GENDER MODERATION IN CULINARY MSEs

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Abstract

Financial Inclusion is an important aspect in supporting the development of Micro and Small Enterprises (MSEs), especially the culinary sector in Medan City. The development of digital financial services requires business actors to have adequate *Digital Financial Literacy*, while *Social Networks* can be a source of information and access to financial services. This study aims to analyze the influence of *Digital Financial Literacy* and *Social Networks* on *Financial Inclusion* with age and gender as moderating variables. The study used a quantitative approach involving 125 MSEs in the culinary sector in Medan City as respondents. Data were collected through questionnaires and analyzed using *Partial Least Squares-Structural Equation Modeling* (PLS-SEM) with the help of SmartPLS. The analysis included testing the measurement model, structural model, and the moderating effects of age and gender. The results showed that *Digital Financial Literacy* and *Social Networks* had a positive and significant effect on *Financial Inclusion*. Gender was proven to moderate both relationships, while the *R Square* value of 0.621 indicated that the model was able to explain 62.1% of the variation in *Financial Inclusion*. These findings underscore the importance of improving digital financial literacy and leveraging social networks to expand access and use of financial services for MSMEs in the culinary sector.

Keywords: *Digital Financial Literacy, Social Network, Financial Inclusion, Age, Gender, Culinary UMK.*

Introduction

Inclusive economic development positions *financial inclusion* as a key indicator in expanding access to financial services for the public and businesses (World Bank, 2018). MSEs contribute over 60% to GDP and employ over 97% of the national workforce, yet they still face barriers to financial access (OJK, 2022). A similar situation is evident in the growing culinary MSEs in Medan, but some businesses still rely on traditional business models and informal funding.

Based on data from the Medan City Cooperatives and Small and Medium Enterprises Office (2026), there are 181 culinary MSMEs in the three sub-districts studied. A pre-survey of 30 entrepreneurs showed that the ability to evaluate information and understand the risks of digital financial services was only 46.7% and 43.3%, respectively, while access to formal credit or financing only reached 43.3%. Furthermore, social media usage reached 70.0%, account ownership 66.7%, and digital payment usage 63.3%, indicating that aspects of financial inclusion still need to be strengthened.

Around 1.4 million businesses in North Sumatra have used QRIS, making the ability to understand and utilize digital financial services increasingly important. Previous research has shown that *digital financial literacy* has a positive impact on *financial inclusion* (Hasan *et al.* , 2022), while *social networks* can expand information, trust, and access to formal financial services (Bongomin *et al.* , 2020). These findings support the importance of examining both factors in the context of culinary MSEs in Medan.

Age and gender are suspected to influence the strength of the relationship between *digital financial literacy* and *social networks* and *financial inclusion*. Age differences are related to the ability to adapt to technology, while gender can be related to access to information and experience using financial services. Previous research has shown inconsistent demographic results, so there is still room to test the moderating role of these factors (Widyastuti *et al*

THE INFLUENCE OF *DIGITAL FINANCIAL LITERACY* AND *SOCIAL NETWORKS* ON *FINANCIAL INCLUSION* : AGE-GENDER MODERATION IN CULINARY MSEs

Nova Amanda Putri et al

., 2024). This study focuses on the influence of *digital financial literacy* and *social networks* on *financial inclusion* among culinary MSEs in Medan. The novelty of the study lies in examining age and gender as moderating variables in this relationship within the culinary MSE context. Therefore, the study aims to analyze the influence of these two main variables and the moderating role of age and gender on *financial inclusion*.

Literature review

Digital financial literacy is the ability to understand, access, use, and evaluate digital financial services effectively and safely (OECD, 2018). Meanwhile, *social networks* are networks of relationships that support the exchange of information, experience, trust, and resources for business activities (Bongomin et al., 2020). Both factors can support MSEs in obtaining information and utilizing financial services to increase *financial inclusion*.

Financial inclusion is a condition where individuals and businesses have access to and the ability to use financial services according to their needs (World Bank, 2018). Measurements include access, availability, service usage, account ownership, digital payments, and access to financing (Sarma, 2012). Age and gender are used as moderating variables because differences in demographic characteristics can be related to technology acceptance, experience, access to information, and financial decision-making (Sanistasya et al., 2019).

Based on the theory explained above, the conceptual framework is as follows:

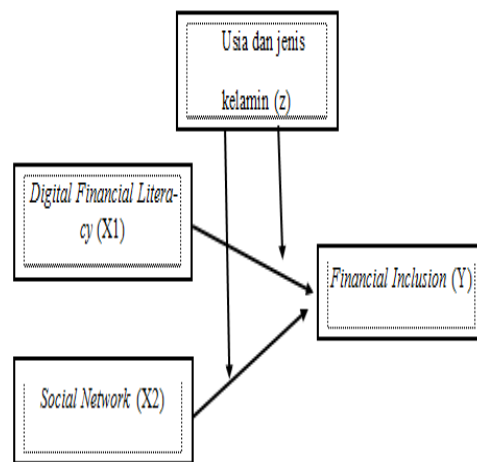


Figure 1 Conceptual Framework

The following is the hypothesis of this study:

- H1: *Digital Financial Literacy* has a positive and significant effect on *Financial Inclusion* among Micro and Small Enterprises (MSEs) in the culinary sector in Medan City.
- H2: *Social Network* has a positive and significant effect on *Financial Inclusion* among Micro and Small Enterprises (MSMEs) in the culinary sector in Medan City.
- H3: Age moderates the influence of *Digital Financial Literacy* on *Financial Inclusion* among Micro and Small Enterprises (MSEs) in the culinary sector in Medan City.
- H4: Age moderates the influence of *Social Networks* on *Financial Inclusion* among Micro and Small Enterprises (MSEs) in the culinary sector in Medan City.
- H5: Gender moderates the influence of *Digital Financial Literacy* on *Financial Inclusion* among Micro and Small Enterprises (MSEs) in the culinary sector in Medan City.
- H6: Gender moderates the influence of *Social Networks* on *Financial Inclusion* among Micro and Small Enterprises (MSMEs) in the culinary sector in Medan City.

Research methods

This study used a quantitative approach with an associative type and *cross-sectional design* on 125 culinary sector MSEs from a population of 181 MSEs in Medan Baru, Medan Petisah, and Medan Johor Districts, with *purposive sampling techniques* and the Slovin formula (Sugiyono, 2019). Data were collected through a 1–5 Likert scale questionnaire and analyzed using PLS-SEM with SmartPLS through evaluation of the *outer model*, *inner model*, and *bootstrapping* (Hair et al., 2022). Moderation testing was conducted using a *two-stage approach* on

THE INFLUENCE OF *DIGITAL FINANCIAL LITERACY* AND *SOCIAL NETWORKS* ON *FINANCIAL INCLUSION* : AGE-GENDER MODERATION IN CULINARY MSES

Nova Amanda Putri et al

the interaction of *Digital Financial Literacy* and *Social Network* with age and gender, with significance determined based on *P-values* <0.05 and a 95% *confidence interval* .

Results and Discussion

Respondent Characteristics

The characteristics of the study respondents included age, gender, length of business, sub-district, and type of business. Data from 125 respondents were used to describe the profile of the study sample.

Table 1. Respondent Characteristics

Characteristics	Category	Frequency	Percentage (%)
Age	19–30 years	50	40.0
	31–45 years	39	31.2
	46–60 years	22	17.6
	>60 years	14	11.2
Gender	Man	68	54.4
	Woman	57	45.6
Length of Business	1–3 years	39	31.2
	4–6 years	54	43.2
	>6 years	32	25.6
Subdistrict	New Field	35	28.0
	Petisah Field	29	23.2
	Medan Johor	61	48.8
Type of business	Fast food	61	48.8
	Processed Products/Cakes/Snacks/Drinks	64	51.2

Source: Data processing results, 2026.

The table shows that the majority of respondents were aged 19–30, male, had been in business for 4–6 years, were from Medan Johor, and ran processed product/cake/snack/beverage businesses. This distribution illustrates the characteristics of the research sample and serves as a descriptive basis for further analysis.

Descriptive Analysis of Research Variables

Descriptive analysis was used to describe the tendency of respondents' answers to *Digital Financial Literacy* , *Social Network* , and *Financial Inclusion* based on the *mean value* . With a scale of 1–5, an interval length of 0.80 produces categories of 1.00–1.80 strongly disagree, >1.80–2.60 disagree, >2.60–3.40 neutral, >3.40–4.20 agree, and >4.20–5.00 strongly agree. The results show that *Digital Financial Literacy* has a mean of 3.715, *Social Network* 3.651, and *Financial Inclusion* 3.643, all of which are in the agree category.

Common Method Bias Testing

The *Common Method Bias* test was conducted to evaluate the possibility of method bias due to all key constructs being measured through *self-report questionnaires* from the same respondent source and data collection period. The examination was conducted using *Harman's Single-Factor Test* by entering all indicators of *Digital Financial Literacy* , *Social Network* , and *Financial Inclusion* into a factor analysis without rotation. The following are the results of the *Common Method Bias* test :

Table 1.
Common Method Bias Test
Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of		Total	% of	
		Variance	Cumulative %		Variance	Cumulative %
1	10,148	28,190	28,190	10,148	28,190	28,190

Source: Data processing results, 2026

Based on the results of *Harman's Single-Factor Test* , the first factor has an *eigenvalue* of 10.148 and is able to explain 28.190% of the total variance of all indicators. This value is smaller than the 50% limit, so a single factor does not dominate the variation in respondents' answers. These results indicate that *common method bias* is not indicated as a dominant problem in the research data. However, the results of this test are diagnostic examinations and cannot be used to state that the data is completely free from the possibility of *common method bias* .

Evaluation of Measurement Model (*Outer Model*)

Measurement model evaluation is conducted to ensure that each indicator is able to measure the established construct validly and reliably. *Outer model testing* includes *outer loading* , *Average Variance Extracted* (AVE), and discriminant validity using the *Heterotrait-Monotrait Ratio*. (HTMT), *Fornell-Larcker* criteria , *cross loading* , and construct reliability through *Cronbach's Alpha* and *Composite Reliability* . The following is an image of the *outer model* of this research:

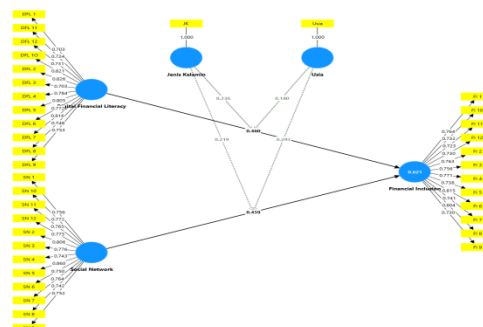


Figure 2. Outer Model
Source: Data processed with SmartPLS , 2026

outer loading value indicates the strength of the relationship between an indicator and the construct it measures. An indicator is deemed to meet convergent validity if its *outer loading value* is ≥ 0.70 . The constructs of age, gender, and interaction use a single indicator, resulting in a *loading value* of 1.000. Based on the data processing results, the following are the results of the *outer loading test* :

The test results show that all indicators of the *Digital Financial Literacy* , *Financial Inclusion* , and *Social Network* constructs have *outer loading* values ≥ 0.70 , thus meeting the convergent validity criteria, with ranges of 0.703–0.826; 0.723–0.815; and 0.742–0.860, respectively. The variables of age, gender, and interaction constructs have *loading values* of 1.000 because they use a single indicator or *interaction term* , so they are not interpreted as evidence of perfect convergent validity. The AVE test is then used to ensure that the reflective constructs meet the convergent validity criteria with an AVE value limit of ≥ 0.50 .

Table 2.
Average Variance Extracted (AVE) Test Results

Construct	AVE
Digital Financial Literacy	0.588
Financial Inclusion	0.572
Social Network	0.597

Source: Data processed with SmartPLS , 2026

Table 3 shows that the AVE value for *Digital Financial Literacy* is 0.588, *Financial Inclusion* is 0.572, and *Social Network* is 0.597, all >0.50 , thus meeting convergent validity. These results indicate that each construct is able to explain more than 50% of the variance in its indicators. Next, discriminant validity was tested using the *Heterotrait-Monotrait Ratio* (HTMT) with the criterion of inter-construct values <0.90 .

Table 3.
Results of the Heterotrait-Monotrait Ratio (HTMT) Test

First Construct	Second Construct	HTMT
<i>Financial Inclusion</i>	<i>Digital Financial Literacy</i>	0.394
<i>Social Network</i>	<i>Digital Financial Literacy</i>	0.293
<i>Social Network</i>	<i>Financial Inclusion</i>	0.427

Source: Data processed with *SmartPLS* , 2026

HTMT evaluation showed a value between *Digital Financial Literacy* – *Financial Inclusion* of 0.394, *Digital Financial Literacy* – *Social Network* of 0.293, and *Financial Inclusion* – *Social Network* of 0.427, all <0.90 so that discriminant validity was met. Age, gender, and interaction constructs were not the main basis for the HTMT evaluation because they used a single indicator or were formed for moderation analysis. Furthermore, discriminant validity was tested using the *Fornell-Larcker Criterion* by comparing the square root of AVE and correlations between constructs.

Table 4.
Fornell Larcker Criterion Test Results

Construct	<i>Digital Financial Literacy</i>	<i>Financial Inclusion</i>	<i>Social Network</i>
<i>Digital Financial Literacy</i>	0.767		
<i>Financial Inclusion</i>	0.378	0.756	
<i>Social Network</i>	-0.211	0.410	0.772

Source: Data processed with *SmartPLS* , 2026

Table 4 shows that the diagonal values of *Digital Financial Literacy* (0.767), *Financial Inclusion* (0.756), and *Social Network* (0.772) are greater than the inter-construct correlation, thus meeting the *Fornell-Larcker discriminant validity* . The *cross-loading results* also show that all indicators have the highest *loading* on their respective constructs, thus meeting the discriminant validity. Furthermore, a reliability test was conducted using *Cronbach's Alpha* and *Composite Reliability criteria* of ≥ 0.70 to assess the internal consistency of the indicators.

Table 5.
Results of Construct Reliability Test

Construct	<i>Cronbach's Alpha</i>	ρ_A	<i>Composite Reliability</i> (ρ_C)	Information
<i>Digital Financial Literacy</i>	0.936	0.942	0.945	Reliable
<i>Financial Inclusion</i>	0.932	0.934	0.941	Reliable
<i>Social Network</i>	0.939	0.942	0.947	Reliable

Source: Data processed with *SmartPLS* , 2026

Table 5 shows that the *Cronbach's Alpha* value is 0.932–0.939, ρ_A is 0.934–0.942, and *Composite Reliability* is 0.941–0.947, all >0.70 so that the three constructs have very good internal consistency. High reliability values still need to be considered because values close to 0.95 can indicate similarities between indicators, but all *Composite Reliability* is still below 0.95 so it does not indicate excessive redundancy.

Structural Model Evaluation (Inner Model)

Structural model evaluation was conducted to assess the model's ability to explain *financial inclusion* and examine the relationships between constructs. *Inner model testing* included multicollinearity through the *Variance Inflation Factor* (VIF), coefficient of determination (*R Square*), magnitude of influence (*F Square*), predictive relevance (*Q Square*), and hypothesis testing through the *path coefficient* . The following is an image of the *inner model* from this study:

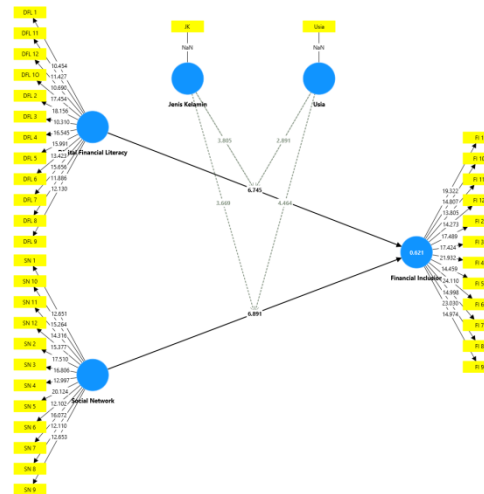


Figure 3. Inner Model

Source: Data processed with *SmartPLS* , 2026

The multicollinearity test showed that all VIF values were in the range of 1.016–1.245 and all were <5.00, so there were no multicollinearity problems in the model. Furthermore, the *R Square* value *Financial Inclusion* of 0.621 and *Adjusted R Square* of 0.595 indicate that the model is able to explain 62.1% of the variation in *Financial Inclusion* with a moderate category. The *f²* value indicates a significant influence of *Digital Financial Literacy* (0.497) and *Social Network* (0.448), while the *Q²* value of 0.342 (>0) indicates that the model has predictive relevance.

Path coefficient testing was performed using a *bootstrapping procedure* to determine the direction, magnitude, and significance of the relationship within the model. The hypothesis was accepted if the *t-statistics* were >1.96 and *p-values* were <0.05 at the 5% significance level. A positive coefficient indicates a unidirectional relationship. Based on the data processing results, the following are the *path coefficient test results* :

Table 8.
Path Coefficient Test Results and Hypothesis Decisions

Connection	β	<i>t-statistic</i>	<i>p-value</i>	CI 95%	Decision
<i>Digital Financial Literacy</i> → <i>Financial Inclusion</i>	0.460	6,745	<0.001	[0.331; 0.601]	H1 accepted
<i>Social Network</i> → <i>Financial Inclusion</i>	0.459	6,891	<0.001	[0.324; 0.585]	H2 accepted
Gender → <i>Financial Inclusion</i>	-0.063	1,002	0.317	[-0.181; 0.066]	Not significant*
Age → <i>Financial Inclusion</i>	-0.094	1,375	0.169	[-0.230; 0.040]	Not significant*
Age × <i>Digital Financial Literacy</i> → <i>Financial Inclusion</i>	0.180	2,891	0.004	[0.057; 0.302]	H3 is accepted
Age × <i>Social Network</i> → <i>Financial Inclusion</i>	0.293	4,464	<0.001	[0.154; 0.412]	H4 accepted
Gender × <i>Digital Financial Literacy</i> → <i>Financial Inclusion</i>	0.236	3,805	<0.001	[0.117; 0.360]	H5 is accepted
Gender × <i>Social Network</i> → <i>Financial Inclusion</i>	0.219	3,669	<0.001	[0.098; 0.330]	H6 is accepted

Source: Data processed with *SmartPLS* , 2026

The test results show that *Digital Financial Literacy* ($\beta = 0.460$; $t = 6.745$; $p < 0.001$) and *Social Network* ($\beta = 0.459$; $t = 6.891$; $p < 0.001$) have a positive and significant effect on *Financial Inclusion* , so H1 and H2 are

THE INFLUENCE OF *DIGITAL FINANCIAL LITERACY* AND *SOCIAL NETWORKS* ON *FINANCIAL INCLUSION* : AGE-GENDER MODERATION IN CULINARY MSES

Nova Amanda Putri et al

accepted. Age ($\beta = -0.094$; $p = 0.169$) and gender ($\beta = -0.063$; $p = 0.317$) do not have a significant direct effect, but both are proven to moderate the relationship of independent variables to *Financial Inclusion*. The interactions of age $\times$ *Digital Financial Literacy* ($\beta = 0.180$; $p = 0.004$), age $\times$ *Social Network* ($\beta = 0.293$; $p < 0.001$), gender $\times$ *Digital Financial Literacy* ($\beta = 0.236$; $p < 0.001$), and gender $\times$ *Social Network* ($\beta = 0.219$; $p < 0.001$) were all significant, so H3–H6 were accepted.

Table 9. Results of Measurement Invariance of Composite Models (MICOM) Test

Construct	Original Correlation	5% Quantile	p-value
<i>Digital Financial Literacy</i>	0.982	0.943	0.331
<i>Financial Inclusion</i>	0.991	0.987	0.104
Gender	1,000	1,000	0.128
<i>Social Network</i>	0.982	0.954	0.222
Age	1,000	1,000	0.224

Source: Data processed with SmartPLS, 2026

MICOM results show that all constructs have a $p\text{-value} > 0.05$, namely *Digital Financial Literacy* 0.331, *Financial Inclusion* 0.104, gender 0.128, *Social Network* 0.222, and age 0.224, so that *compositional invariance* is fulfilled. Together with the fulfillment of *configural invariance*, these results indicate the existence of *partial measurement invariance*, so that the path coefficients between groups can be compared. Furthermore, *Bootstrap Multi-Group Analysis* with 5,000 *bootstrap samples*, a significance level of 5%, and *two-tailed testing* was used to determine the differences in path coefficients between the Ready-to-Eat Food and Processed Products/Cakes/Snacks/Beverages groups.

Table 10.
Multi-Group Analysis (MGA) Results Based on Business Type

Connection	β Ready- to-Eat Food	β Processed Products	Difference β	p-value (2- tailed)	Decision
Digital Financial Literacy $\rightarrow$ Financial Inclusion	0.480	0.474	0.007	0.965	No different
Social Network $\rightarrow$ Financial Inclusion	0.383	0.520	-0.138	0.350	No different
Gender $\rightarrow$ Financial Inclusion	-0.086	0.011	-0.096	0.477	No different
Age $\rightarrow$ Financial Inclusion	0.001	-0.138	0.139	0.338	No different
Gender $\times$ Digital Financial Literacy $\rightarrow$ Financial Inclusion	0.233	0.155	0.078	0.540	No different
Age $\times$ Digital Financial Literacy $\rightarrow$ Financial Inclusion	0.165	0.163	0.002	0.960	No different
Age $\times$ Social Network $\rightarrow$ Financial Inclusion	0.319	0.140	0.179	0.222	No different
Gender $\times$ Social Network $\rightarrow$ Financial Inclusion	0.299	0.115	0.184	0.212	No different

Source: Data processed with SmartPLS, 2026

The results of the *Multi-Group Analysis* show that all differences in path coefficients between the Ready-to-Eat Food and Processed Products/Cakes/Snacks/Beverages groups are insignificant because all *two-tailed p-values* are > 0.05 . This applies to the influence of *Digital Financial Literacy*, *Social Network*, age, and gender on

Financial Inclusion , as well as all moderating effects of age and gender. Thus, the type of business does not show significant differences in the strength of the relationship or the moderating effect between the variables tested.

Discussion

Digital Financial Literacy has a positive and significant effect on *Financial Inclusion* with a coefficient of 0.460, a *t*-statistic of 6.745, a *p*-value <0.001, and an f^2 of 0.497, indicating a large effect. Descriptively, *Digital Financial Literacy* has a mean 3,715 respondents agreed, indicating a positive tendency towards understanding and utilizing digital financial services. This finding aligns with Al-Shami *et al* . (2024) and Hasan *et al* . (2022) who demonstrated a positive relationship between *digital financial literacy* and *financial inclusion* , and aligns with the concept of digital financial literacy as the ability to use digital financial services effectively and responsibly (OECD, 2018).

Social Networks also have a positive and significant effect on *Financial Inclusion* with a coefficient of 0.459, a *t*-statistic of 6.891, a *p*-value <0.001, and an f^2 of 0.448, which is considered large. The mean value *A Social Network* score of 3,651 indicates that respondents tend to view their social networks positively in supporting business activities. This finding aligns with Bongomin *et al* . (2020) who demonstrated the importance of social networks in expanding information and access to formal financial services.

Age has been shown to moderate the effect of *Digital Financial Literacy* on *Financial Inclusion* with an interaction coefficient of 0.180, a *t*-statistic of 2.891, a *p*-value of 0.004, and an f^2 of 0.084, which is considered small. The positive interaction coefficient indicates that the relationship between *Digital Financial Literacy* and *Financial Inclusion* tends to be stronger at higher age levels, although the direct effect of age on *Financial Inclusion* is not significant. This finding is conceptually in line with Widyastuti *et al* . (2024) who showed that demographic factors, including age, are relevant in the study of *Digital Financial Inclusion* in Indonesia.

Age was also shown to moderate the effect of *social networks* on *financial inclusion* , with an interaction coefficient of 0.293, a *t*-statistic of 4.464, a *p*-value <0.001, and an f^2 of 0.200, all of which are considered moderate. These results indicate that the positive relationship between *social networks* and *financial inclusion* tends to be stronger at higher age levels, while the direct effect of age is insignificant. This finding can be linked to Bongomin *et al* . (2020) who identified social networks as an important factor in supporting access to and utilization of financial services.

Gender has been shown to moderate the effect of *Digital Financial Literacy* on *Financial Inclusion* with an interaction coefficient of 0.236, a *t*-statistic of 3.805, and a *p*-value <0.001, although the effect size is relatively small with an f^2 of 0.136. With coding 1 = male and 2 = female, the positive coefficient indicates that the relationship between *Digital Financial Literacy* and *Financial Inclusion* tends to be stronger in the female group. This finding is consistent with the pattern of Widyastuti, Respati, and Mahfirah (2024) who found differences in the tendency of the relationship between *Digital Financial Literacy* and *Digital Financial Inclusion* based on gender, although the difference in that study was not significant.

Gender also moderates the effect of *social networks* on *financial inclusion* with an interaction coefficient of 0.219, a *t*-statistic of 3.669, a *p*-value <0.001, and an f^2 of 0.109, which is considered small. Using the same coding, these results indicate that the relationship between *social networks* and *financial inclusion* tends to be stronger among women, while the direct effect of gender is not significant. This finding reinforces the relevance of social networks in financial inclusion as explained by Bongomin *et al* . (2020), while also demonstrating that gender characteristics can influence the strength of this relationship in the context of culinary MSEs. being researched.

Conclusion

This study shows that *Digital Financial Literacy* and *Social Network* have a positive and significant effect on *Financial Inclusion* , while age and gender are proven to moderate both relationships. Limitations of the study include the use of *purposive sampling* , coverage of only three sub-districts, *self-report data* , *cross-sectional design* , and the use of a single indicator for demographic variables, so that generalization and temporal interpretation need to be done carefully. Future researchers are advised to expand the area and number of respondents, use a longitudinal design, combine questionnaires with objective measurements of *Digital Financial Literacy* , and add relevant control variables to make the research results more comprehensive.

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